

Patients' Perception of Lasers in Dentistry

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Background and Objective: Replacement of the dental handpiece (drill) has been of great interest in dentistry because of the overwhelming fear by patients to this method of tooth preparation. The driving force to find a replacement seems to be the undocumented requests of dental patients. Patients' perception of lasers and their ability to make a visit to the dentist easier is the focus of this study.

Study Design/Materials and Methods: Surveys were given to 100 patients that questioned their perception of lasers.

Results: The survey showed that 69% of the responding patients thought that lasers would make their visit to the dentist easier. **Conclusions:** It seems that dental patients' perception of the laser is positive, and patients feel that lasers can make their visit to the dentist less traumatic. *Lasers Surg Med* 20:47–50, 1997.

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INTRODUCTION

Many times dentists have seen the white knuckles of patients on the chair handles as the dentist depresses the foot pedal of the dental handpiece. Dentists have also had numerous discussions with patients who ask them when the drill will be replaced with a laser. There is a great desire on the part of dentists to make office treatment easier for their patients, and lasers may provide such an opportunity.

Soon after the development of lasers, researchers investigated the potential use of lasers in dentistry. In 1964 Stern and Sognnaes used the ruby laser to try to reduce the susceptibility of teeth to decay [1–3]. Adrian investigated the ruby laser and found that the thermal effects were too severe and that pulpal damage occurred [4]. After these initial years, hard tissue (enamel and dentin) applications were investigated but in a very limited way.

The laser wavelengths that were available during the last two decades were investigated for hard tissue applications. The research was limited to the available wavelengths which were not necessarily optimal for hard tissue ablation. The development of lasers which could produce wave-

lengths with much higher absorption in the components of dental hard tissues (i.e., water and hydroxyapatite) has led to more efficient ablation of dental hard tissues. Laser ablation has been investigated with the intention of replacing the dental handpiece.

Hibst and Keller investigated the ablation efficiency of the Er:YAG laser ($\lambda = 2.94 \mu\text{m}$) and its thermal effects on dental hard tissues and dental restorative materials [5–7]. They found that this laser could cut dental hard tissues without causing a significant thermal effect. Wigdor and Visuri also investigated the use of the Er:YAG laser with the addition of water spray on both hard tissues and dental materials [8–10].

The motivating force for this research is the perceived desire of patients to have dental treatment performed by some instrument other than the dental drill. Dentists also desire to provide easier treatment for their patients.

Research has progressed to find a replacement for the dental drill. There are two issues

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TABLE 1. Distribution of the Answers to Questions 1-3

Question	Yes	No	Undecided
1. Do you think lasers will make your visit to the dentist easier?	69	10	21
2. Would you be willing to pay an additional fee if the laser can be used instead of the drill?	56	21	23
3. Would you be willing to take part in a study of lasers in dentistry?	48	47	5

which are obvious, that of researchers' overestimating the desire of patients for a replacement of the dental drill and, most importantly, whether the laser is the instrument that will equal patients' expectations. It is yet to be proven whether a laser can effectively and efficiently remove both dental hard tissues and restorative materials. Of great importance are the types of stimuli (i.e., vibration and noise) that the patients experience when a laser is used and whether these stimuli will have the same negative reaction in patients as the presently used dental handpiece.

Since the researchers and manufacturers efforts are based on the perceived desires of patients it seems imperative that the perception of patients be queried. This work discusses a survey of the perception of dental patients and whether they feel a laser can reduce the fear of dental treatment.

MATERIALS AND METHODS

Patients at Ravenswood Dental Group, which is located in the Ambulatory Care Center at Ravenswood Hospital Medical Center, were asked if they were willing to participate in a survey about lasers. This question was asked by the receptionist, and no prior information about lasers was given to these patients. The only preselective requirement of patient type was that the patient had to be an adult and able to make their dental care decisions for themselves. The survey asked only three questions: 1. Do you think lasers will make your visit to the dentist easier, and why? 2. Would you be willing to pay an additional fee if a laser could be used instead of the drill? 3. Would you like to be a part of a study of lasers in dentistry? Only those that completed the survey were included in this study.

RESULTS

The demographics of Ravenswood Hospital Medical Center include a population of approxi-

mately 250,000 for the three predominant zip codes on the north side of Chicago. The median household income is \$23,500 with the population distribution of 62% white, 8% black, 14% Asian, and 16% other.

Table 1 lists the answers that the 100 patients gave for the three questions. The "undecided answers" were those answers that were not directly "yes" or "no." The predominant reason for "undecided" for question 1 was that the patient did not have enough information to make a decision. For question 2, the predominant reason for "undecided" was based on insurance reimbursement. It appeared that those patients would be willing to incur an added fee if their insurance covered the use of the laser.

Table 2 is a list of reasons patients felt the laser would be an improved method of dental treatment compiled from question 1. A number of patients listed more than one reason for their preference of the laser. Table 3 is a list of reasons for the "no" answers to question 1.

One patient felt that there was nothing wrong with existing methods of dental treatment. Two patients refused to take part in the survey. One did not want to bother, and the other did not understand the survey.

Ninety-five percent confidence limits were determined [11]. For question 1 the limits were 59.9–78.1% for the answer "yes," for question 2, 46.3–65.7% for "yes," and for question 3, 38.0–58.0% for "yes."

DISCUSSION

In the recent past the pursuit of a replacement for the dental drill has led a number of laser manufacturers to misrepresent their products. They have suggested that their lasers cut hard dental tissues, prior to obtaining research data substantiating this use. The underlying question is whether any laser will allay the fears many dental patients have of traditional dental treatment. The intent of this report was to evaluate

TABLE 2. Stated Reasons by Patients Why They Feel the Laser Will Make the Visit Easier

Reasons	No.
Less pain	31
Faster	25
No drilling	10
No noise	10
No reason	5
Safer	4
More efficient & accurate	4
No novocaine needed	2
Decreased fear	1
More advanced	1
No vibration	1
Different approach	1
Decreased fear of infection	1
Less stress	1

TABLE 3. Stated Reasons by Patients Why They Feel the Laser Would Not Make the Visit Easier

Reasons	No.
No reason given	5
Not safe	1
Question benefits	1
No problem with existing methods	1
Plan to have teeth out anyway	1

the perception of dental patients and to substantiate the efforts by laser manufacturers to produce a laser which will replace the dental handpiece.

Patient perception is a very important motivator in the dental profession. The ultimate question is whether lasers will provide less negative stimuli than the dental drill. The lasers presently under study are pulsed and cause an audible sound which may provoke a fearful response in patients.

The perception of patients seems very positive toward lasers. Over two-thirds of the patients questioned in the survey felt that the laser would be an easier method of dental care. This response is of great interest considering no information on lasers was given to the patients before the survey. Over 50% of patients combined stated that lasers would be less painful and faster. These opinions are held by the patients possibly because of the media portrayal of lasers in many disciplines of medicine and surgery as an instrument that can treat disease better than other conventional methods.

Over 50% of the patients stated that they would be willing to incur an additional fee for the

laser. This further substantiates that patients desire that the dental profession continue its quest for replacing the dental drill.

The responses to the third question were almost equally divided. Still, almost 50% of the patients felt strongly enough about the concept of lasers being used in place of the dental drill that they would be willing to participate in a laser study. Presumably they feel confident that the provider would have researched the laser being used so that the risk to the patients would be non-existent.

The important message from this survey is that if patients' wishes are one of the important motivating factors behind dental laser research, then the research presently underway should continue. However, the perception of patients and what they feel lasers can provide for them in dentistry must in some way conform to the technical reality of surgical lasers. Lasers must ultimately provide safe and effective replacement of the dental drill. If the laser is more time consuming, not as efficient, or unable to perform all of the procedures thus requiring a handpiece to be used for some of these procedures, lasers may not be accepted by most dentists. It is also essential that lasers not be introduced for clinical treatment, because of patients desires, before they are proven safe and effective. Patients must not be lured by dentists with lasers prior to the establishment of proven methods and indications, and the trust of patients in the prudent use of lasers by dentists must not be compromised.

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